

**Amendments to the Claims:**

Please cancel Claim 2 and amend Claims 1 and 17 as indicated in the following listing of claims, which replaces all prior versions and listings of claims in the application.

**Listing of Claims:**

1           1.       (Currently Amended) A method for investigating an image set of  
2       geophysical data distributed over a first  $N$ -dimensional volume where  $N \geq 2$  using a computer  
3       system that includes an input device, a processor, and a display device, the method comprising:  
4               receiving, with the input device, the image set of geophysical data and a target set  
5       of geophysical data distributed over a second  $N$ -dimensional volume;  
6               selecting, with the processor, a subvolume of a the target set of geophysical data  
7       ~~distributed over a second  $N$ -dimensional volume~~, the subvolume enclosing a known feature of  
8       interest; ~~and~~  
9               at each of a plurality of positions within the first  $N$ -dimensional volume,  
10       calculating, with the processor, a cross-correlation between the data distributed within the  
11       subvolume and corresponding data distributed in the first  $N$ -dimensional volume about the each  
12       of the plurality of positions; and  
13               displaying for a user on the display device a distribution of results of calculating  
14       the cross-correlation throughout the first  $N$ -dimensional volume.

1           2.       (Canceled).

1           3.       (Original) The method recited in claim 1 further comprising:  
2       modifying the subvolume in accordance with a user instruction; and  
3       at each of a plurality of positions within the first  $N$ -dimensional volume,  
4       calculating a cross-correlation between the data distributed within the modified subvolume and  
5       corresponding data distributed in the first  $N$ -dimensional volume about the each of the plurality  
6       of positions.

1                   4.     (Original) The method recited in claim 3 wherein modifying the  
2 subvolume comprises changing a size of the subvolume.

1                   5.     (Original) The method recited in claim 3 wherein modifying the  
2 subvolume comprises changing a shape of the subvolume.

1                   6.     (Original) The method recited in claim 1 wherein:  
2                   each of the image set and the target set consists of real data, the method further  
3 comprising respectively transforming the real data of the image and target sets to complex data  
4 by performing a Hilbert transform of the real data; and  
5                   calculating the cross-correlation comprises calculating a complex cross-  
6 correlation between the transformed data distributed within the subvolume and corresponding  
7 transformed data distributed in the first  $N$ -dimensional volume about the each of the plurality of  
8 positions.

1                   7.     (Original) The method recited in claim 6 further comprising calculating  
2 an amplitude envelope and phase distribution from the complex cross-correlation over the first  
3  $N$ -dimensional volume.

1                   8.     (Original) The method recited in claim 1 wherein:  
2                   each of the image set and the target set consists of real data; and  
3                   calculating the cross-correlation comprises calculating a real cross-correlation.

1                   9.     (Original) The method recited in claim 1 further comprising normalizing  
2 the data distributed within the subvolume over the subvolume prior to calculating the cross-  
3 correlation.

1                   10.   (Original) The method recited in claim 1 wherein  $N = 3$ .

1                   11.   (Original) The method recited in claim 1 wherein  $N = 4$ .

1                   12.   (Original) The method recited in claim 1 wherein the image and target  
2 sets comprise seismic data.

1                   13.     (Original) The method recited in claim 1 wherein the image and target  
2     sets comprise mathematical transforms of seismic data.

1                   14.     (Original) The method recited in claim 1 wherein the image and target  
2     sets comprise prestack data.

1                   15.     (Original) The method recited in claim 1 wherein the image set is the  
2     target set.

1                   16.     (Original) The method recited in claim 1 wherein the subvolume is a  
2     parallelepiped.

1                   17.     (Currently Amended) A method for investigating an image set of real  
2     geophysical data distributed over a first  $N$ -dimensional volume where  $N \geq 2$  according to a  
3     known feature of interest identified in a target set of real geophysical data distributed over a  
4     second  $N$ -dimensional volume using a computer system that includes an input device, a  
5     processor, and a display device, the method comprising:

6                   receiving, with the input device, the image set of real geophysical data and the  
7     target set of real geophysical data;

8                   transforming, with the processor, the real geophysical data of the first  $N$ -  
9     dimensional volume to complex data by performing a Hilbert transform on the real geophysical  
10    data of the first  $N$ -dimensional volume;

11                  transforming, with the processor, the real geophysical data of the second  $N$ -  
12    dimensional volume to complex data by performing a Hilbert transform on the real geophysical  
13    data of the second  $N$ -dimensional volume;

14                  selecting a subvolume, with the processor, of the target set that encloses the  
15    known feature of interest in accordance with a user instruction; ~~and~~

16                  at each of a plurality of positions within the first  $N$ -dimensional volume,  
17    calculating, with the processor, a complex cross-correlation between the transformed data within  
18    the subvolume and corresponding transformed data distributed in the first  $N$ -dimensional volume  
19    about the each of the plurality of positions; and

20                    displaying for a user on the display device a distribution of results of calculating  
21                    the complex cross-correlation throughout the first  $N$ -dimensional volume.

1                    18.     (Original) The method recited in claim 17 further comprising:  
2                            modifying the subvolume in accordance with another user instruction; and  
3                            at each of a plurality of positions within the first  $N$ -dimensional volume,  
4                    calculating a complex cross-correlation between the transformed data within the modified  
5                    subvolume and corresponding transformed data distributed in the first  $N$ -dimensional volume  
6                    about the each of the plurality of positions.

1                    19.     (Original) The method recited in claim 17 further comprising normalizing  
2                    the transformed data distributed within the subvolume over the subvolume prior to calculating  
3                    the complex cross-correlation.

1                    20.     (Original) The method recited in claim 17 wherein the image set is the  
2                    target set.

1                    21.     (Original) A computer-readable storage medium having a computer-  
2                    readable program embodied therein for directing operation of a computer system including an  
3                    input device, a processor, and a display device, wherein the computer-readable program includes  
4                    instructions for operating the computer system for investigating geophysical data in accordance  
5                    with the following:

6                            receiving, with the input device, an image set of geophysical data distributed over  
7                    a first  $N$ -dimensional volume where  $N \geq 2$ ;

8                            receiving, with the input device, a target set of geophysical data distributed over a  
9                    second  $N$ -dimensional volume;

10                            receiving, with the input device, a first user instruction identifying a subvolume of  
11                    the target set that encloses a known feature of interest; and

12                            calculating, with the processor at each of a plurality of positions within the first  
13                     $N$ -dimensional volume, a cross-correlation between the data distributed within the subvolume  
14                    and corresponding data distributed in the first  $N$ -dimensional volume about the each of the  
15                    plurality of positions.

1                   22.   (Original) The computer-readable storage medium recited in claim 21  
2 wherein the computer-readable program further includes instructions for displaying, for a user  
3 with the display device, a distribution of results of calculating the cross-correlation throughout  
4 the first  $N$ -dimensional volume.

1                   23.   (Original) The computer-readable storage medium recited in claim 21  
2 wherein the computer-readable program further includes:  
3                   instructions for receiving, with the input device, a second user instruction to  
4 modify the subvolume; and  
5                   instructions for calculating, with the processor at each of a plurality of positions  
6 within the first  $N$ -dimensional volume, a cross-correlation between the data distributed within the  
7 modified subvolume and corresponding data distributed in the first  $N$ -dimensional volume about  
8 the each of the plurality of positions.

1                   24.   (Original) The computer-readable storage medium recited in claim 21  
2 wherein:  
3                   each of the image set and the target set consists of real data, the computer-  
4 readable program further including instructions for respectively transforming the real data of the  
5 image and target sets to complex data by performing a Hilbert transform of the real data; and  
6                   the instructions for calculating the cross-correlation comprise instructions for  
7 calculating a complex cross-correlation between the transformed data distributed within the  
8 subvolume and corresponding transformed data distributed in the first  $N$ -dimensional volume  
9 about the each of the plurality of positions.

1                   25.   (Original) The computer-readable storage medium recited in claim 24  
2 wherein the computer-readable program further includes instructions for calculating an  
3 amplitude envelope and phase distribution from the complex cross-correlation over the first  $N$ -  
4 dimensional volume.

1                   26.   (Original) The computer-readable storage medium recited in claim 21  
2 wherein the computer-readable program further includes instructions for normalizing, with the  
3 processor, the data distributed within the subvolume prior to calculating the cross-correlation.